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Theoretical and Experimental Analysis of an Atmospheric Water Harvesting Solar Powered Device

Adeyanju Anthony Ademola

University of the West Indies, Trinidad

Abstract

Two-thirds of the world's population is experiencing water shortages. The water in the form of vapor and droplets in the atmosphere, estimated to be about 13 thousand trillion liters (Schneider, 2011), is a natural resource that could address the global water problem. Although there has been interest in dewing from moist air and fog capture, these processes require either the frequent presence of 100% relative humidity or a large amount of energy and thus are not viable solutions for the capture of water from air. Ideally a water harvesting system should operate with a material that can capture and release water with minimum energy requirements and that is powered by low grade energy sources.

This study designed, analyzed and tested a semi-open atmospheric water harvesting solar powered device using atmospheric water vapor membrane technology.

The processor is a device which extract water molecules from the atmosphere, ultimately causing a phase change from vapor to liquid. The research focuses on the development of a correlation for the amount of desiccant to the amount of water produced to determine the sufficient amount required for the specific application.

This correlation was found to be MW = 1.0776MS – 0.4752, with a solar panel efficiency of 10.7%.

Using this relationship amount of desiccants needed to produce certain amount of water was determined.

Keywords: Antibacterials for systemic use; Drugs consumption; ATC/DDD-methodology

Funding:

Dr. Adeyanju AnthonyA. obtained his Ph.D. in Mechanical Engineering at the University of the West Indies, Trinidad.

He received the UWI-NGC 2014 Research Awards as the Most Outstanding Graduate Researcher 2011/2012.

He has industrial experience at the Nigerian National Petroleum Corporation, Concord Airline and Gas Airline in Nigeria. He is a registered engineer with the Council of Regulation of Engineering in Nigeria (COREN)and a member of Nigerian Society of Engineers (NSE). His research interests is in area of Thermofluidic/energy. He is currently lecturing in the Mechanical Engineering Department at the University of the West Indies, Trinidad.

Methods

This study was a retrospective, descriptive study performed in the national university of pharmacy (Kharkiv, Ukraine) during a 6 year period (from 2013 to 2018).

The data on consumption in the community of antibacterials for systemic use (AB) (ATC group J01) in Ukraine (UA) were analyzed according to the ATC/DDD international system for classification and consumption of drugs according to the WHO's measurement methodology. Use of the ATC/DDD-methodology allows standardization of drug groups and represents stable drug utilization metric to enable comparisons of drug use between countries and to examine trends in drug use over time and in different settings [9]. DDD values are actually the assumed average maintenance dose per day for a drug used for its main indication for an average adult. DDDs per 1000 inhabitants per day (DID) was used as a measurement unit for analyzing consumption AB. It was calculated by using the following formula:

DDDs/1000 inhabitants/day=DDDs.1000÷population.365 (1)

- DDDs is the number of consumed DDD per year was calculated by using the following formula:

DDDs=amount of consumed drug(mg)÷DDD(mg) (2)

If DDD were not assigned were used prescribed daily dose (PDD), which was calculated from official instructions for the use of medicines.

The data by the number of packages of AB sold in the country by years for this study were obtained from analytical system Morion which shows how many packages were sold [10].

The data by population in UA were obtained from State Statistics Service [11]:

- 2013 – 45 489 600;
- 2014 – 43 001 000;
- 2015 – 42 844 900;
- 2016 – 42 672 500;
- 2017 – 42 485 473;

~~***Corresponding author:** Kerry Gwynne*, Northern Beaches Health Services, New South Wales, Australia E-mail: kerry.gwynne@health.nsw.gov.au~~

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- 2018 – 42 269 802.

Consumption data for the United Kingdom (UK) were obtained from the Annual epidemiological report for 2014, 2015, 2016, 2017 and 2018 (European Centre for Disease Prevention and Control) [12, 13, 14, 15, 16].

Results

Consumption indicators in UA decreased from 11.5358DID in 2013 to 10.0884DID in 2015 and increased from 11.0792DID in 2016 to 12.4731DID in 2018.

Consumption of AB increased during 6 year period for 8.1% in UA. This growth is driven by an increase in the consumption of these groups of AB: J01A Tetracyclines for 3.5%; J01C Beta-lactam antibacterials for 2.3%; J01D Other beta-lactam antibacterials for 23.5%; J01F Macrolides, Lincosamides and Streptogramins for 56.2%; J01M Quinolone antibacterials for 2.9%; J01R Combinations of antibacterials for 11.6% (Table 1).

Consumption decrease occurred in the following groups: J01B Amphenicols for 5.98%; J01E Sulfonamides and Trimethoprim for 21.9%; J01G Aminoglycoside antibacterials for 32.2% and J01X Other antibacterials for 13.0% (Table 1).

Most significant indicator was the difference in consumption patterns of different groups of AB in UA and UK. As we see, in 2018 consumption of Tetracyclines in UK was 6.1 times higher than in UA. Beta-lactam antibacterials have been consumed in 2.1 times more in UK than in UA in 2018. But AB from group J01D other beta-lactam antibacterials and J01M Quinolone antibacterials were consume in 7.9 and 3.7 times more in UA than in UK in 2018.

Consumption of J01E Sulfonamides and Trimethoprim; J01F Macrolides, Lincosamides and Streptogramins and J01X Other antibacterials were almost at the same level between UA and UK in 2018.

There is no data about consumption of J01B Amphenicols, J01G Aminoglycoside antibacterials and J01R Combinations of antibacterials in UK in the Annual epidemiological reports [12-16].

Throughout the study period, antibiotics were consumed more in the UK than in UA. Difference in AB consumption between the two countries was in 1.6 times in 2013; in 1.7 times in 2014; in 1.8 times in 2015; in 1.6 times in 2016; in 1.5 times in 2017 and in 1.3 times in 2018. The largest difference in AB consumption between the two countries was recorded in 2015 (1.8 times).

Discussion

1- Effect of seeding of wood-ash on biogas production using pig waste and cassava peels

2- Hydro power energy resources in Nigeria

3- Theoretical and experimental investigation of heat transfer in packed beds

4- Effects of steel fibers and iron filings on thermal and mechanical properties of concrete for energy storage application

5- Experimental and theoretical analysis of a beverage chiller

6- Improving biogas yield using media materials.

7- Comparison of the experimental performance of a thermoelectric refrigerator with a vapor compression refrigerator

References

1. World Health Organisation (2012) The evolving threat of antimicrobial resistance: options for action.

2. Centers for Disease Control and Prevention (2013) Antibiotic resistance threats in the United States.

3. Interagency Coordination Group on Antimicrobial Resistance (2019) Report to the secretary-general of the United Nations.

4. World Health Organization (2015) Global action plan on antimicrobial resistance. Geneva.

5. Iakovlieva L, Bahlai T (2019) β-lactam antibiotics in Ukraine: market and consumption analysis in 2013-2018. ScienceRise: Pharmaceutical Science 2.

6. Iakovlieva L, Bahlai T, Berdnyk O (2019) Aminoglycoside group antibiotics: analysis of the pharmaceutical market and consumption study. Proceedings of the scientific-practical conference with international participation, dedicated to the 20th anniversary of the founding of the Day of the Pharmaceutical Worker of Ukraine Modern pharmacy: history, realities and prospects of development. Kharkiv, Ukriine now 2: 170-171.

7. Iakovlieva L, Bahlai T (2020) Tetracyclines: analysis of the Ukrainian pharmaceutical market and consumption compared to European countries. Social Pharmacy in Health Care 1.

8. Iakovlieva L, Bahlai T (2020) Sulfonamides and trimethoprim (ATC code J01E Sulfonamides and Trimethoprim): market analysis and consumption in Ukraine in 2013-2018. Proceedings of the VIII International Scientific and Practical Distance Conference. Management and marketing in the modern economy, science, education and practice. March 19, 2020. Ukraine pp: 274-281.

9. WHO Collaborating Centre for Drug Statistics Methodology (2020) Guidelines for ATC classification and DDD assignment. Oslo 2019.

10. Analytical system of Ukrainian pharmaceutical market “Morion”.

11. State Statistics Service of Ukraine.

12. European centre for disease prevention and control (2018) Antimicrobial consumption-Annual Epidemiological Report for 2018. Annuale pidemiological report for 2014. Stockholm: ECDC.

13. European centre for disease prevention and control (2018) Antimicrobial consumption 2015. Annuale pidemiological report.

14. European centre for disease prevention and control (2018) Antimicrobial consumption 2016. Annuale pidemiological report.

15. European centre for disease prevention and control. Antimicrobial consumption 2017. Annual epidemiological report.

16. European centre for disease prevention and control (2019) Antimicrobial consumption in the EU/EEA. Annuale pidemiological report for 2018.

17. Joint Formulary Committee (2020) British national formulary 76 London: British Medical Association and Royal Pharmaceutical

Society of Great Britain; BNF 76 September 2018 - March 2019.

18. Gov.UK (2013) UK Five Year Antimicrobial Resistance Strategy 2013 to 2018. september 2013.
19. Policy Paper (2019) Global and Public Health Group, Emergency Preparedness and Health Protection Policy Directorate. The UK's 20-year vision for antimicrobial resistance.
20. Policy Paper (2019) Global and Public Health Group, Emergency Preparedness and Health Protection Policy Directorate. Tackling antimicrobial resistance 2019–2024 The UK's five-year national action plan.
21. Cabinet of Ministers of Ukraine (2019) On approval of the National Antimicrobial Resistance Action Plan.